ELECTROSTATIC VOLTMETER

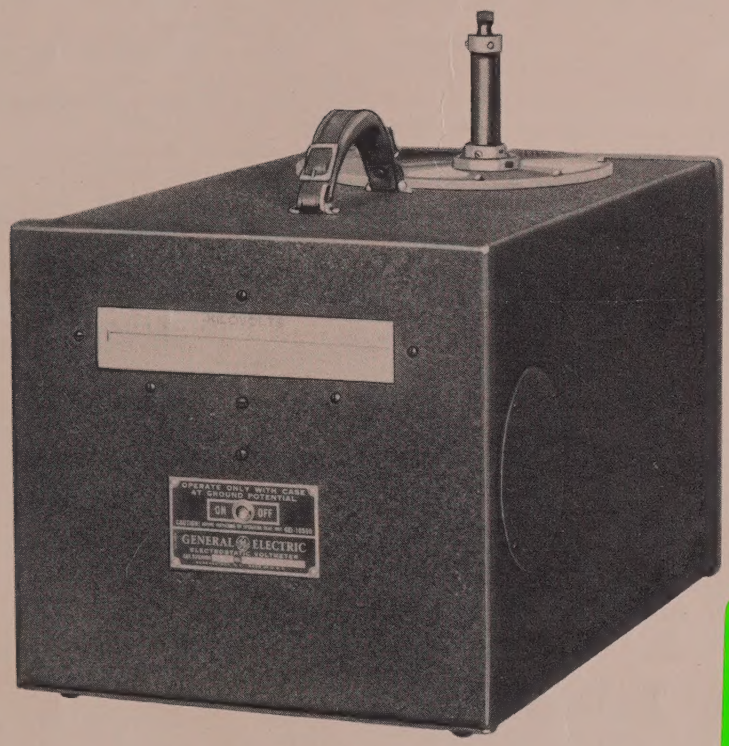

Fig. 1
Electrostatic voltmeter
rated 15 kilovolts

MP MASTER
MA32617

APPLICATIONS

This is a portable electrostatic instrument with unusual characteristics designed for a-c and d-c measurements of voltage on systems where one line is grounded. Its field of usefulness embraces every application where a high-impedance, high-voltage instrument is required.

An electrostatic voltmeter is usually used for high-voltage measurements when the available energy for operation of the instrument is very small.

Typical applications are:

(1) Measurement of applied voltage during dielectric tests.
(2) Study of electrostatic phenomena such as the generation of charges by moving belts or other objects.
(3) Determination of peak voltage by the well-known vacuum-tube method (Fig. 2).
(4) Measurement of exceptionally high voltage when used with a voltage divider.

IMPROVED PERFORMANCE

This new electrostatic voltmeter overcomes most of the disadvantages that were inherent in the older types. A unique design utilizing a light beam pointer and magnetic damping results in an instrument with performance that approaches that of conventional types of indicating instruments.

An accuracy of 2 per cent of full-scale value is maintained in all ratings on direct current and alternating current up to 700 cycles per second.

Reading time is cut to the minimum—the responsiveness is approximately 4 seconds. The combination of a "light beam" pointer and conveniently distributed scale (Fig. 3) allows accurate readings to be taken quickly and easily. The target appears on the scale as a bright line that can easily be seen under all conditions of external illumination.

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A 15-kv instrument has a charging current of approximately 120 microamperes for full-scale deflection when the frequency is 60 cycles per second.

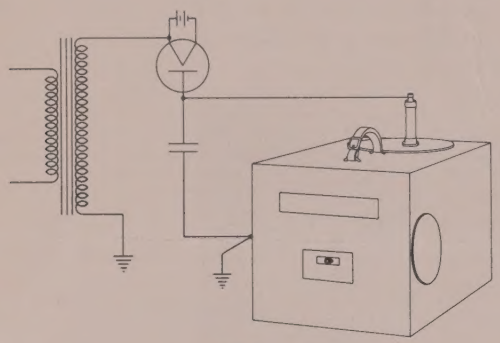

Fig. 2
Schematic diagram—electrostatic voltmeter and associated apparatus used to determine peak voltage

RETAINS CALIBRATION

These instruments are shipped from the factory completely assembled and calibrated—ready for immediate use. To place an instrument in operation, it is necessary only to ground the case, energize the light source, and make the high-voltage connections.

The calibration is not disturbed when an instrument is moved from one location to another so long as a reasonably horizontal position is maintained. This feature, together with high accuracy and fast response, represents a great improvement over older types.

ELECTROSTATICALLY SHIELDED

Effective shielding against stray electrostatic fields is provided by the grounded aluminum case.

ELEMENT

The moving element is the inner of two concentric cylindrical sections and is mounted on a pivoted shaft that is free to rotate in jewel bearings. This element is electrically connected to a high-voltage terminal. Two outer cylindrical sections are stationary and electrically connected to the instrument case.

When a potential difference exists between the two sections, the moving element rotates against the restoring torque of a phosphor-bronze control spring. For adjusting the zero position an external adjuster is conveniently located.

A mirror for reflecting a beam of light onto the scale is mounted on the moving element shaft. Aluminum damping vanes also mounted on this shaft provide magnetic damping. This construction results in a low-inertia moving system that gives fast indication with little overshoot.

CASE

A sturdy aluminum case with black-crystalline-lacquer finish houses the instrument mechanism. This case must be grounded at all times. With any other connection the case is ineffective as a shield and hazardous to the operator. To facilitate grounding, a terminal is provided on one side of the case.

The optical system is accessible through an opening in the case. This is normally covered by an aluminum plate to exclude dust and foreign particles. Other features include a convenient leather carrying handle and rubber feet for protecting the surface on which the instrument is used.

OPTICAL SYSTEM

The optical system consists of (a) light source, (b) focusing lens, (c) mirror on the moving shaft, and (d) scale. The light source is controlled by a toggle switch on the front of the instrument. Two dry cells operate a MAZDA straight-filament lamp below normal voltage, thus insuring infrequent lamp replacement.

The position of the focusing lens is adjustable through an opening in the side of the case. A mirror on the moving shaft reflects a light beam onto a ground-glass window provided in the scale.

The entire optical system is contained within the instrument case.

Fig. 3
Typical scale
(Approx 3/5 actual size)

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HIGH-VOLTAGE TERMINAL

High-voltage connection is made to a terminal on top of a Textolite tube which is mounted near the center of a circular sheet of transparent plastic material. Inside the terminal is a current-limiting resistor that serves as a protective device if overvoltage in excess of the flashover value is accidently applied.

The circular plate of transparent plastic insulates the high-voltage terminal from the case and allows ready inspection of the element without disturbing the instrument in any way. This unique construction provides maximum protection and minimizes possibilities of a flashover even if overvoltage is applied.

A-c and D-c

Rating Kilovolts	Cat. No.	List Price GO-87B	Approx Mean Capacitance—Micromicrofarads	APPROX WT IN LB	
				Net	Ship.
3	5310699G2	$400.00	40 to 80	29	76
5	5310699G2	400.00	25	29	76
10	5310699G2	400.00	18	29	76
15	5310699G1	400.00	17	29	76
20	5310699G1	400.00	16	29	76

When electrostatic voltmeters are used on direct current, the maximum value of applied voltage will be indicated. If several successive readings are to be taken, the instrument must be discharged by short-circuiting the high-voltage terminal to ground before each reading. This paragraph applies to d-c operation only.

ORDERING DIRECTIONS

Give catalog number and rating. Unless otherwise specified, scale will be marked in rms kilovolts.

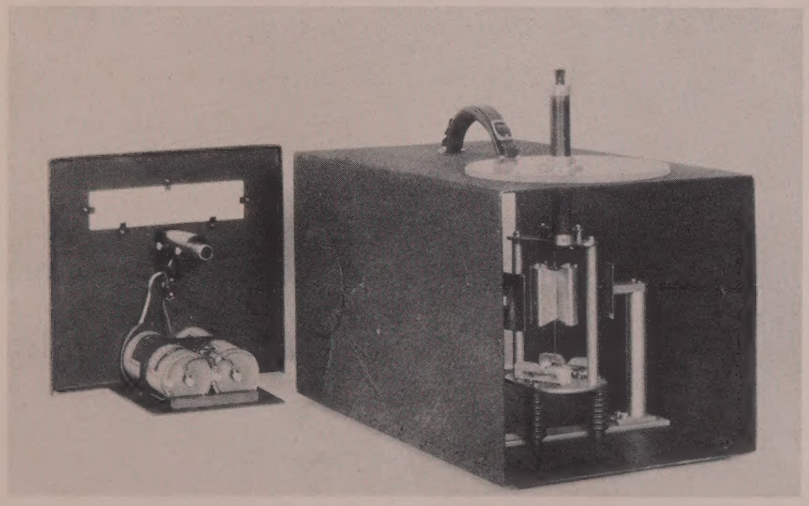

Fig. 4
Instrument with cover removed showing moving system and optical system

Prices and other data subject to change without notice

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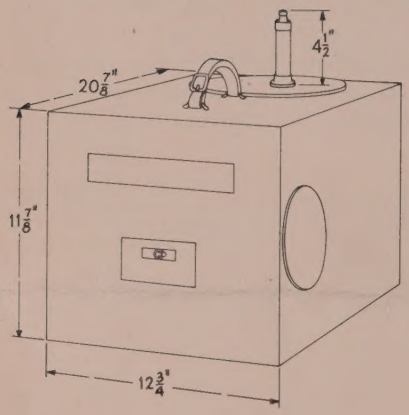

Fig. 5
Dimensions

ADDITIONAL RANGE

These instruments can be converted to any desired full-scale rating within the limits of 3 kv to 20 kv by making minor adjustments to the mechanism, marking a new scale, and replacing the nameplate.

Such flexibility increases the usefulness of the instrument and results in an ideal construction when future requirements cannot be anticipated.

Voltage dividers can be used for extending the range above 20 kv. Such an arrangement is a relatively inexpensive method of obtaining a multi-range instrument.

Special electrostatic instruments for high-voltage measurements on ungrounded systems can be constructed.

GENERAL ELECTRIC

SCHENECTADY, N.Y.

for Service
Refer to
LC Yapp - 3EC6
607 Old First Bank Bldg
Ft Wayne

MP MASTER
MA32617

8-38 (3M)
Filing No. 6200